

2022 KANSAS SEVERE WEATHER PREPAREDNESS Information Packet



SEVERE WEATHER PREPAREDNESS WEEK

March 7-11, 2022

TORNADO SAFETY DRILL

Tuesday, March 8, 2022

10AM CST/9AM MST

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2021 Kansas Tornado Overview

<u>Tornadoes:</u>	37	25 below the 1950-2020 average of 62 49 below the past 30 year average of 86 34 below the past 10 year average of 71
<u>Fatalities:</u>	0	<u>Injuries:</u> 0
<u>Longest track:</u>	12.89 miles (Haskell, October 12, EF1)	
<u>Strongest:</u>	EF2 (Gray, March 13)	
<u>Most in a county:</u>	4 (Ford)	
<u>Tornado days:</u>	13 (Days with 1 or more tornadoes)	
<u>Most in one day:</u>	11 (October 12)	
<u>Most in one month:</u>	18 (May)	
<u>First tornado of the year:</u>	March 5 (Douglas County, 3:54 pm CST, EFU, 0.01 mile length, 10 yard width)	
<u>Last tornado of the year:</u>	October 26 (Reno County, 9:10 pm CST, EF0, 0.43 mile length, 275 yard width)	
<u>Length of tornado season:</u>	235 days (Days between first and last tornado)	

----- 2021 Monthly Tornado Totals -----

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
EF5	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF4	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF3	0	0	0	0	0	0	0	0	0	0	0	0	0	0%
EF2	0	0	1	0	0	0	0	0	0	0	0	0	1	3%
EF1	0	0	0	0	1	0	0	0	0	9	0	0	10	27%
EF0	0	0	1	0	4	0	1	1	0	3	0	0	10	27%
Unknown	0	0	2	0	13	0	0	0	0	1	0	0	16	43%
Total	0	0	4	0	18	0	1	1	0	13	0	0	37	100%
Percent	0.0%	0.0%	11%	0.0%	49%	0.0%	2.5%	2.5%	0.0%	35%	0.0%	0.0%		

Violent (EF4—EF5) in red, Strong (EF2-EF3) in yellow, Weak (EF0-EF1) in green, Unknown in orange. Monthly totals in gray. Tornadoes not causing damage ranked as unknown due to insufficient data to assign a rating. (Percent values may not add to 100% due to rounding)

Annual Highlights: Over the course of 2021, a total of 37 tornadoes occurred in the state of Kansas. This is significantly lower than the 10 year average of 71 tornadoes per year and the 30 year average of 86 tornadoes per year. The strongest tornado was an EF2 occurring on March 13th in Gray County. With a path length of 12.15 miles, the tornado had the second longest path length for the year. No injuries or fatalities associated with the tornadoes were reported.

May was the most active month for tornadoes with 18 reported. Most of these tornadoes occurred between May 24th and May 26th when separate tornado outbreaks resulted in a total of 12 tornadoes and damage to at least one town. A late season outbreak on October 12th resulted in an additional 11 tornadoes across the state.

Tornadoes are given a rating based on the damage that is produced; the degree or level of damage is assigned as estimated wind speed. When a tornado does not leave behind damage, it is difficult to near impossible to make a correct wind speed estimate. Thus tornadoes leaving behind no noticeable damage are given an EF-Unknown (EF-U) rating.

KANSAS SEVERE WEATHER PREPAREDNESS WEEK
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Kansas Tornado Statistics

by County

1950 - 2021

TORNADOES, FATALITIES, AND INJURIES

Legend: Tor = Tornado | Fat = Fatalities | Inj = Injuries

County	Tor	Fat	Inj	County	Tor	Fat	Inj	County	Tor	Fat	Inj
Allen	27	0	4	Greenwood	45	0	18	Pawnee	54	0	1
Anderson	15	3	12	Hamilton	33	0	1	Phillips	41	0	1
Atchison	16	0	11	Harper	64	0	1	Pottawatomie	34	1	5
Barber	41	0	2	Harvey	49	1	63	Pratt	74	3	10
Barton	107	2	40	Haskell	32	0	10	Rawlins	51	0	4
Bourbon	19	0	7	Hodgeman	59	0	4	Reno	87	0	22
Brown	46	0	5	Jackson	33	4	17	Republic	62	0	3
Butler	87	28	225	Jefferson	41	0	101	Rice	50	0	6
Chase	41	0	2	Jewell	43	0	2	Riley	30	0	51
Chautauqua	21	0	0	Johnson	45	0	12	Rooks	53	0	6
Cherokee	40	4	66	Kearny	46	0	0	Rush	53	0	8
Cheyenne	47	0	0	Kingman	67	0	1	Russell	79	1	7
Clark	42	0	0	Kiowa	61	11	74	Saline	46	0	66
Clay	45	1	31	Labette	43	1	29	Scott	58	1	1
Cloud	52	1	8	Lane	48	0	2	Sedgwick	89	13	360
Coffey	24	0	5	Leavenworth	31	2	30	Seward	39	0	15
Comanche	42	0	2	Lincoln	33	0	2	Shawnee	56	18	528
Cowley	82	77	293	Linn	14	0	3	Sheridan	43	0	0
Crawford	37	4	43	Logan	33	0	0	Sherman	114	0	0
Decatur	48	0	5	Lyon	50	7	222	Smith	45	0	2
Dickinson	40	1	17	Marion	47	1	2	Stafford	73	3	5
Doniphan	20	0	2	Marshall	36	0	1	Stanton	24	0	0
Douglas	43	1	64	McPherson	55	1	16	Stevens	25	1	5
Edwards	56	0	7	Meade	57	0	0	Sumner	88	5	14
Elk	26	2	8	Miami	21	4	10	Thomas	50	0	1
Ellis	66	0	6	Mitchell	51	0	5	Trego	63	5	101
Ellsworth	51	0	0	Montgomery	36	1	1	Wabaunsee	43	1	26
Finney	100	1	41	Morris	35	0	7	Wallace	40	0	4
Ford	111	0	2	Morton	20	1	2	Washington	41	2	12
Franklin	30	3	34	Nemaha	40	0	3	Wichita	35	0	4
Geary	21	0	3	Neosho	31	0	4	Wilson	16	0	0
Gove	58	0	3	Ness	53	0	4	Woodson	12	0	8
Graham	42	0	0	Norton	30	0	0	Wyandotte	10	2	36
Grant	26	0	9	Osage	48	17	6				
Gray	55	0	3	Osborne	46	0	13				
Greeley	42	0	0	Ottawa	35	2	12	Total	4856	237	2950

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Kansas Tornadoes 2021

Neoyenne	Rawlins	Decatur	Norton	Phillips	Smith	Jewell	Republic	Washington	Marshall	Nemaha	Brown	Doniphan
1	3	1										1
herman	Thomas	Sheriden	Graham	Rooks	Osborne	Mitchell	Cloud	Clay	Pottawatomie	Jackson	Atchison	Le
1	3	1										
Wallace	Logan	Gove	Trego	Ellis	Russell	Lincoln	Ottawa	Dickinson	Riley	Shawnee	Jefferson	Johns
3	1			2					Geary	Wabaunsee	Douglas	1
						Ellsworth	Saline		Morris	Lyon	Osage	Franklin
eeley	Wichita	Scott	Lane	Ness	Rush	Barton	Rice	McPherson	Marion	Chase		1
						2	1					
milton	Kearny	Finney	Hodgeman	Pawnee	Stafford		Reno	Harvey	Butler	Greenwood	Coffey	Anderson
			2				1					
		Gray	Ford	Edwards		Pratt		Sedgwick		Woodson	Allen	Bour
		2	4	2								
anton	Grant	Haskell		Kiowa		Kingman				Wilson	Neosho	Crawf
1		1		2					Elk			
orton	Stevens	Seward	Meade	Clark	Comanche	Barber	Harper	Sumner	Cowley	Chautauqua	Montgomery	Labette
								1				Chero

37 tornadoes, 38 counties

Kansas Tornado Facts

Days with more than 20 tornadoes

Date	#Tornadoes
05/23/08	70
04/14/12	43
06/15/92	39
05/05/07	36
05/24/16	34
06/04/55	33
05/29/04	28
10/26/06	28
05/25/97	25
06/09/05	25
05/15/91	24
07/07/04	23
05/06/15	22
04/26/91	21
06/15/09	21

Kansas Tornado Count by Decade

1950s: 560
1960s: 457
1970s: 303
1980s: 339
1990s: 789
2000s: 1192
2010s: 768
2020s: 54

Most Tornadoes in One Episode

May 23, 2008	70 Tornadoes
April 14, 2012	43 Tornadoes
June 15-16, 1992	41 Tornadoes

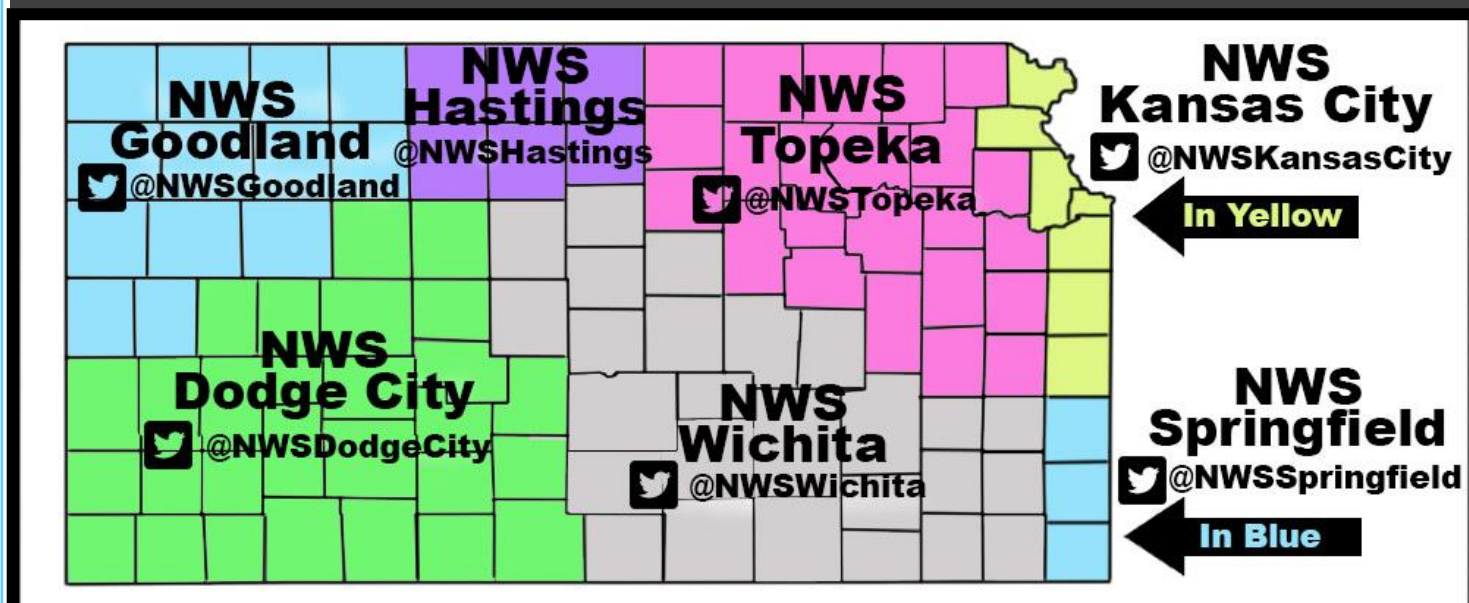
Did you know...

There are seven National Weather Service offices that serve portions of Kansas!

National Weather Service (NWS) offices in Kansas are located in Goodland; Dodge City; Wichita; Topeka; Hastings, Nebraska; Pleasant Hill (Kansas City), Missouri; and Springfield, Missouri. Each office is staffed by a team of highly trained meteorologists, technicians, electronics technicians, information technology specialists, hydrologists and administrative assistants. The NWS offices are staffed 24 hours a day, seven days a week, 365 days a year.

Contact the NWS office in your area to learn more about weather, weather safety, NOAA Weather Radio, office tours, or to learn more about careers in meteorology in the NWS or in NOAA.

We are here to serve you!



Here is severe weather terminology you may encounter.

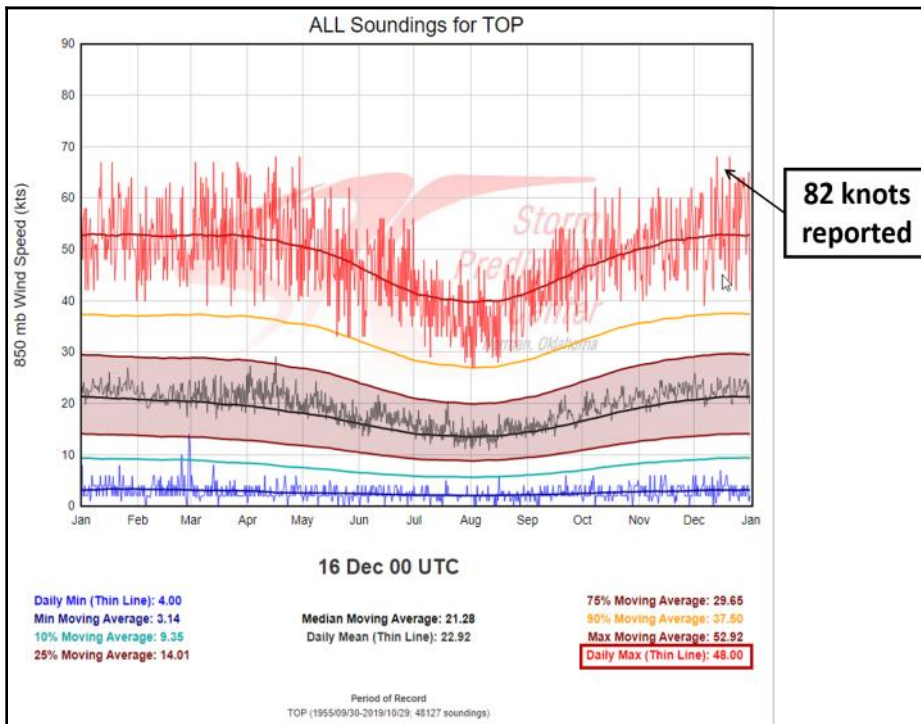
- **Severe Thunderstorm** – The National Weather Service issues severe thunderstorm warnings for storms that are currently or are capable of producing winds of 58 mph or stronger and/or hail one inch in diameter or larger. Severe thunderstorms are often much stronger than this minimum criteria, so it is a good idea to take severe thunderstorm warnings seriously.
- **Tornado** – A tornado is a violently rotating column of air in contact with the ground either as a pendant from a cumuliform cloud or underneath a cumuliform cloud, and it is often (but not always) visible as a funnel cloud. A funnel cloud is a condensation cloud typically funnel-shaped and extending outward from a cumuliform cloud; it is associated with a rotating column of air.
- **Flash Flood** – A flash flood is flooding that occurs very rapidly and usually within six hours of heavy rainfall. Flash flooding may occur along creeks, rivers or streams. It can also occur in low lying or urban areas where drainage is poor. Water levels can rise very quickly during flash flooding including locations that did not receive the heavy rainfall but are located downstream from areas that received an extreme amount of rainfall. Flash flooding can occur in the winter months when rain falls on existing snowpack and causes it to melt rapidly. Flooding is the number one severe weather killer in the U.S.

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December 15th, 2021—A day for the record books

Section 1: Weather Overview

A powerful and strengthening low pressure system moved rapidly from the Colorado Rockies into the Plains and eventually over Lake Superior on December 15, 2021. This system was very unusual for the associated strength of the winds. The storm brought a devastating combination of multiple hazards across the state of Kansas including large devastating wildfires, severe thunderstorms, damaging wind gusts and blowing dust.



Non-Thunderstorm Wind Gusts:

Winds above the surface increased due to the strengthening of the low pressure system as it approached the state. In fact, the wind speeds captured by the NWS Topeka upper air sounding on December 15th showed over 90 mph winds at 4000 feet, which was stronger than anything recorded at that level on that date, going back to 1955 (Image 1). The warm and dry air beneath the cold air above resulted in strong mixing which brought those strong winds down to the surface. The end result was widespread non-thunderstorm wind gusts of 75-100 mph. These gusts resulted in damage to homes, infrastructure, schools, and buildings (Image 2).

Image 1 - Data plot of NWS Topeka upper air sounding climatology. The sounding measured wind speeds on December 15, 2021 of over 82 knots or 94 mph winds at 4000 feet which was stronger than anything recorded at that level going back to 1955.

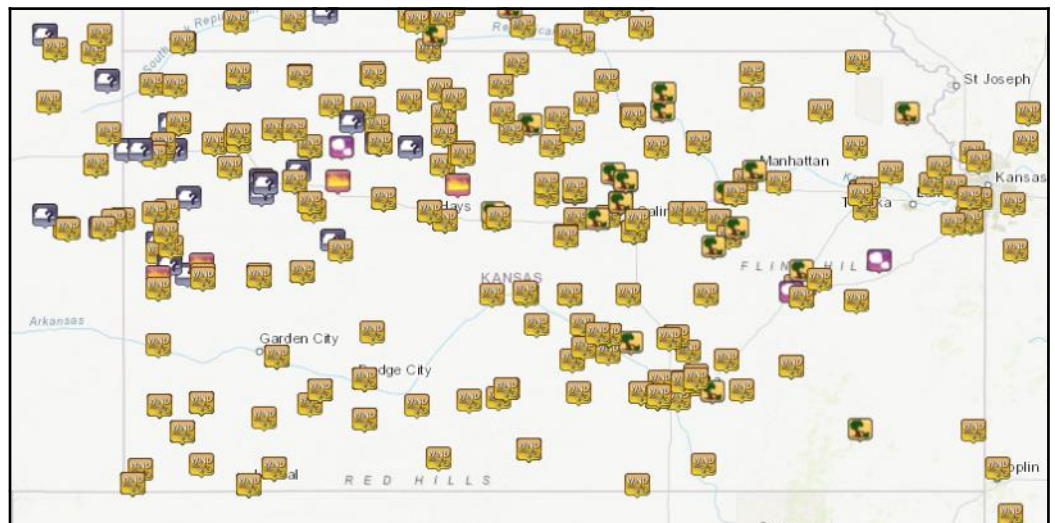


Image 2 - Snapshot of multiple storm reports that occurred across the state of Kansas. See Section 2: Reports for more specific storm report details.

Wildfires: Due to the combination of intense non-thunderstorm winds of 75-100 mph, very dry air, unusually high temperatures and low humidity, extremely critical fire weather conditions developed across parts of western and central Kansas during the day. From the Storm Prediction Center, this was the first Extreme Critical fire risk area for the month of December since records began in 1999 across the Central Plains (Image 3). Once fires started they exhibited extreme behavior including rapid spread at more than 50 mph. This led to extreme fire weather growth and spread over the course of 6-8 hours during the late afternoon and evening. Per the Kansas Forest Service, the total acreage burned across Kansas on December 15th was 163,755.9 acres with 121,621.6 acres burned in the Four County Fire (Image 4). Three Fire Warnings were issued for fires which threatened some structures in Kansas. Unfortunately, these fires did result in two fatalities.

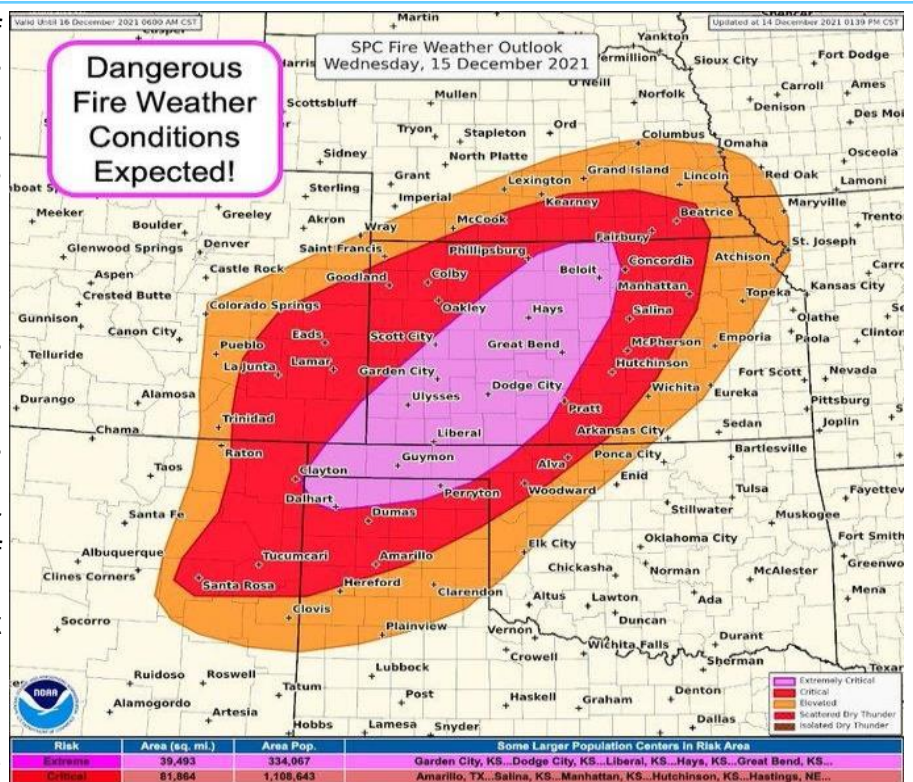


Image 3 - From the Storm Prediction Center, this was the first Extremely Critical fire risk area for the month of December since records began in 1999 across the Central Plains.

December 15th, 2021 Wildfire Perimeters Update

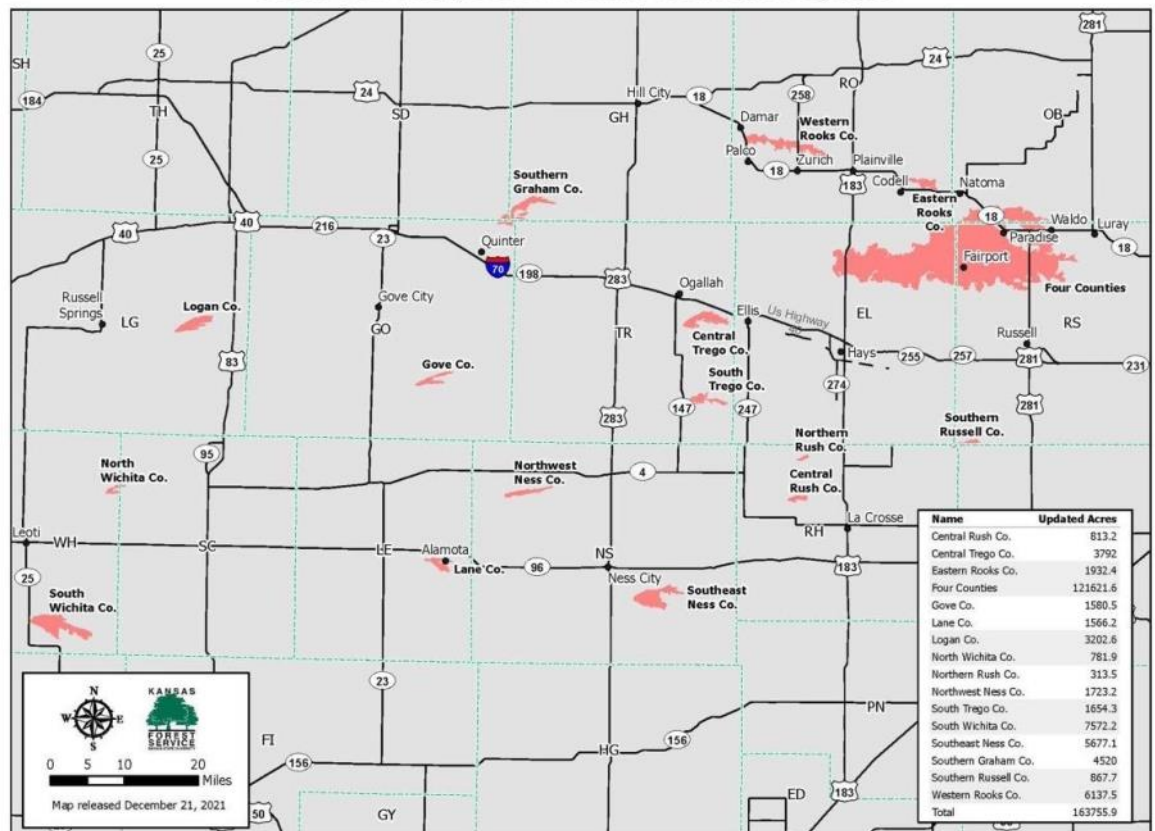


Image 4 - From the Kansas Forest Service, the total acreage burned across Kansas was 163,755.9 acres with 121,621.6 acres burned in the Four County Fire.

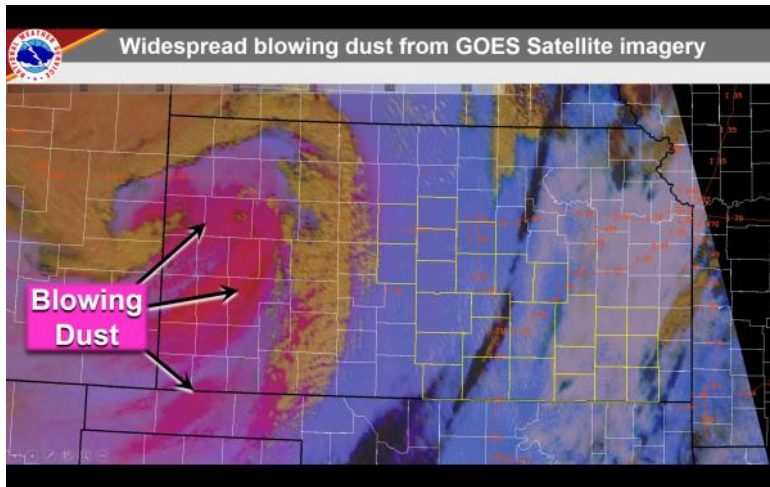


Image 5 - Satellite detected widespread blowing dust across western Kansas at 1 PM on Dec 15, 2021.

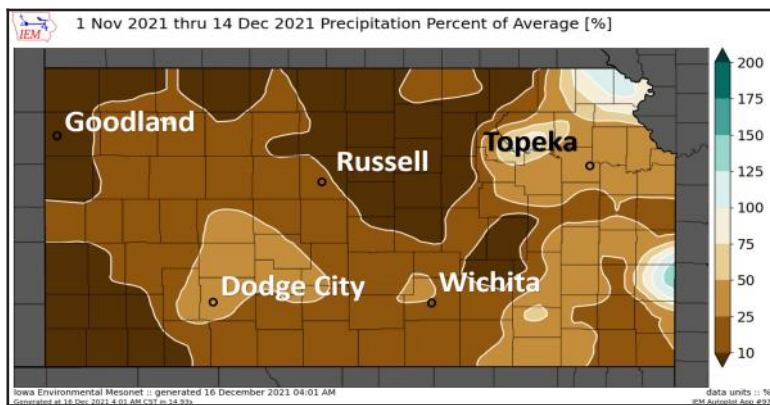


Image 6 - Precipitation Percent of Normal (Nov 1 - Dec. 14, 2021). Abnormally dry weather preceded this event allowing widespread blowing dust to develop.

Blowing Dust: Once the non-thunderstorm winds of 75+ mph developed, widespread blowing dust was observed thanks to the very dry conditions over the previous month and a half (Image 5). In fact, most of the state had received well below 50% of normal precipitation with moderate drought conditions expanding into portions of the western half of the state (Image 6). At least one fatality was associated with a car accident in reduced visibility due to blowing dust in western Kansas.

Severe Weather: As the surface low pressure system quickly strengthened, a line of severe thunderstorms developed and rapidly moved across the eastern half of the state bringing strong, damaging winds and large hail. Overall there were 123 severe convective reports (hail and thunderstorm wind) from this event which exceeds the previous December record of 20 back in 2016; records began in 1950 (Images 7 and 8). These storms resulted in damage to homes and infrastructure. The Storm Prediction Center has classified this event as a derecho. For more information on derechos, visit: <https://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm>

Section 2: Reports

There were well over 300 reports documented for this event which includes severe weather,

non-thunderstorm wind gusts, dust storms and wildfire. We included a small sampling of the various hazards in this report. For a comprehensive list of the damage reports including non-thunderstorm wind gusts, thunderstorm related winds, and wildfire reports in Kansas for December 15, 2021, please see:

Western Kansas:
<https://go.usa.gov/xtUTe>

Eastern Kansas:
<https://go.usa.gov/xtUTS>

KS December Severe Reports Since 1950 (Tornado, Thunderstorm Wind, Hail)	
2021	123 (Preliminary)
2016	20
1975	14
2008	14
1999	10
2002	9
1956	4
1982	4
1988	4
1972	2
2011	2
2014	2
1959	1
2003	1
2010	1
2019	1
Courtesy: NCDC Severe Events Database	

Image 7 - Kansas December severe convective reports (tornado, hail, thunderstorm wind) since 1950. Preliminary Kansas December 2021 severe reports are at 123 which is the most on record.

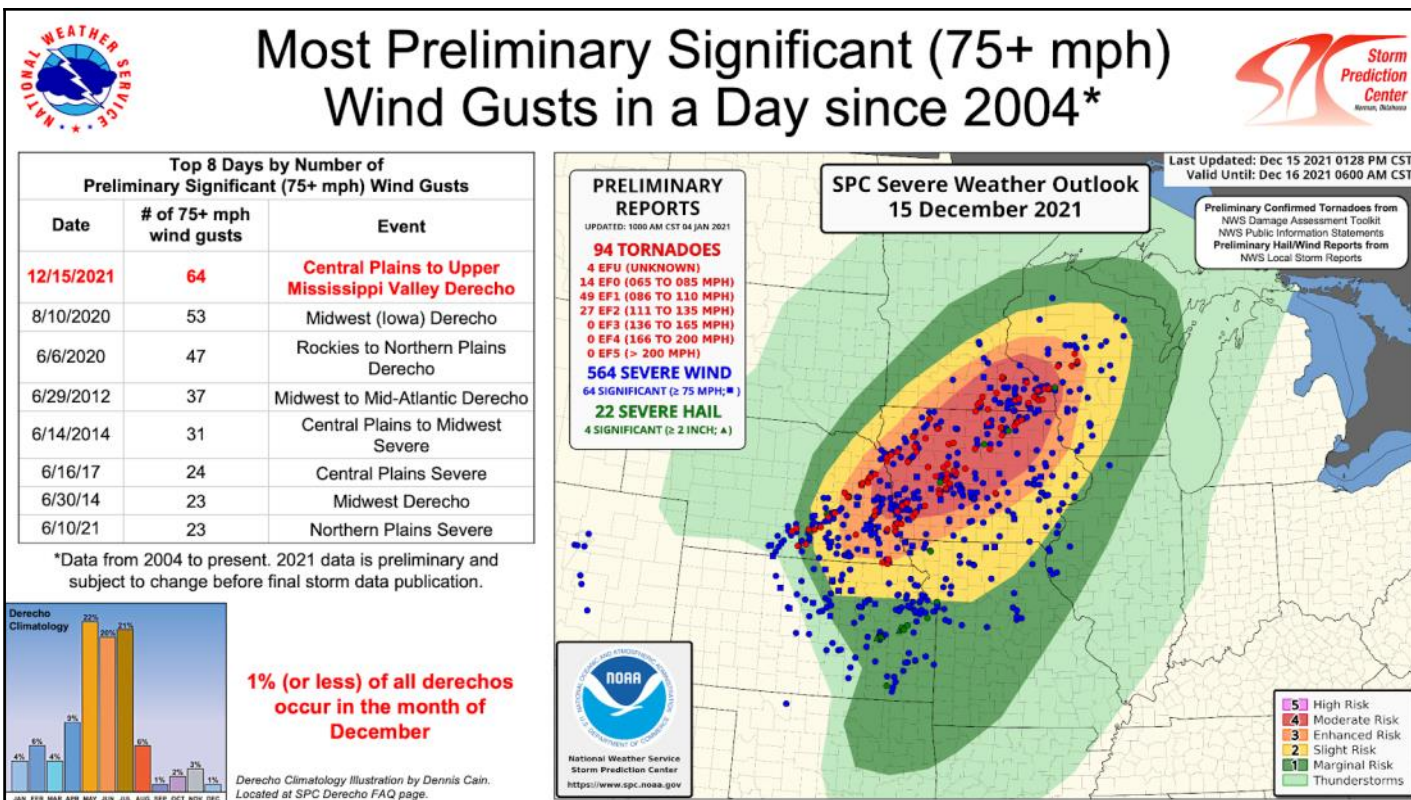


Image 8 - Information graphic from the Storm Prediction Center. This entire event had more 75+ mph wind reports than any event on record.

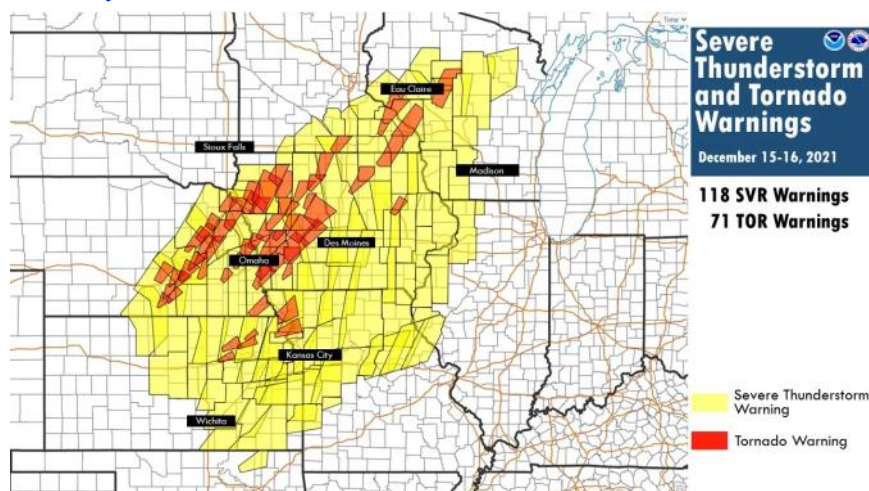


Image 9 - Map showing all severe thunderstorm and tornado warnings issued during the entire event across the Central Plains and Upper Midwest.

Top 10 Thunderstorm Wind Gusts

County	Location	Event Type	Mag. (MPH)	Remark
Clay	2 E Clay Center	TSTM WND GST	85	
Republic	2 NE Courtland	TSTM WND GST	84	Large ash tree down. Bent metal basketball pole in half.
Jefferson	3 NW Perry	TSTM WND GST	80	
Phillips	Woodruff	TSTM WND GST	80	
Rooks	8 NNE Codell	TSTM WND GST	80	
Cloud	Concordia	TSTM WND GST	78	
Riley	2 NE Ogden	TSTM WND GST	76	
Lincoln	Lincoln	TSTM WND GST	75	
Wabaunsee	6 SSE Saint George	TSTM WND GST	75	
Allen	Moran	TSTM WND GST	70	A large tree was knocked down as well as two power poles. Moran was still without power in spots this morning.

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Top 10 Non-Thunderstorm Wind Gusts

County	Location	Event Type	Mag. (MPH)	Remark
Russell	Russell Airport	NON-TSTM WND GST	100	
Saline	2 NNE Salina	NON-TSTM WND GST	98	
Smith	13 NNW Smith Center	NON-TSTM WND GST	97	
Rooks	8 NNE Codell	NON-TSTM WND GST	95	
Geary	1 ENE Grandview Plaza	NON-TSTM WND GST	94	
Cloud	Concordia	NON-TSTM WND GST	90	
Norton	1 ENE Lenora	NON-TSTM WND GST	90	
Finney	3 NW Pierceville	NON-TSTM WND GST	89	
Riley	3 NE Ogden	NON-TSTM WND GST	89	
Wallace	2 WNW Sharon Springs	NON-TSTM WND GST	87	

Various Other Notable Reports

County	Location	Event Type	Mag. (in)	Remark
Logan	Oakley	DUST STORM		Numerous wrecks due to low visibility and strong winds during a dust storm.
Sherman	3 W Edson	DUST STORM		A Semi-truck blew over due to strong winds.
Thomas	Rexford	DUST STORM		*** 1 inj *** Brown out conditions created zero visibility. An accident occurred at mile marker 181 when a semi truck rear ended another semi.
Lyon	6 WSW Emporia	HAIL	4	Softball-sized hail reported at mile marker 137 off I-35.
Osage	3 NNW Melvern	HAIL	2	
Ellsworth	9 WSW Westfall	NON-TSTM WND DMG		A semi-trailer overturned on I-70 at mile marker 229, blocking part of the interstate.
Gove	Gove	NON-TSTM WND DMG		Multiple <u>outbuildings</u> destroyed across the county.
Johnson	2 SSE Lake Quivira	NON-TSTM WND DMG		*** 1 inj *** A tree fell on an individual from high wind gusts ahead of storms.
Russell	Russell	NON-TSTM WND DMG		West facing windows blown out in lots of homes. Numerous trees were knocked down in town.
Saline	2 SW Assaria	NON-TSTM WND DMG		*** 1 inj *** Overturned semi on interstate 135 just south of HWY 4 in Saline county. One man was injured.
Jefferson	Oskaloosa	TSTM WND DMG		Multiple power poles reported down. A large barn blown down at Topeka and Union St.
Leavenworth	3 NNW Jarbalo	TSTM WND DMG		Several outbuildings with roofs blown off.
Morris	1 W White City	TSTM WND DMG		Roofs peeling off buildings as well as the side of a metal building got blown out.
Osborne	13 SW Tipton	TSTM WND DMG		Large tree was blown over. Roof damage to outbuildings.
Ottawa	Minneapolis	TSTM WND DMG		Power lines and transformers down.
Graham	Saint Peter	WILDFIRE		Wildfire caused damage to several outbuildings.
Osborne	3 S Natoma	WILDFIRE		Wildfire first visible on satellite around 330pm has continued to burn to near natoma as of 715pm.
Wichita	Lydia	WILDFIRE		Wildfire north of the town of Lydia burned two homes.

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Summary

Kansas experienced a historically destructive weather event on December 15th, 2021 which caused over 15 million dollars in damages. The high winds and low humidity led to large devastating wildfires that spread with incredible speed, eventually consumed 163,755.9 acres and killed two people. High winds resulted in blowing dust which led to injuries and one fatality due to vehicle accidents in low visibility. Lastly this storm system also triggered a line of severe thunderstorms that produced widespread 60-100 mph wind gusts as the storms passed across central and eastern Kansas. In the end, the resulting strong winds (both thunderstorm and non-thunderstorm) caused a record number of weather stations to measure 75 mph wind gusts or greater across the state.

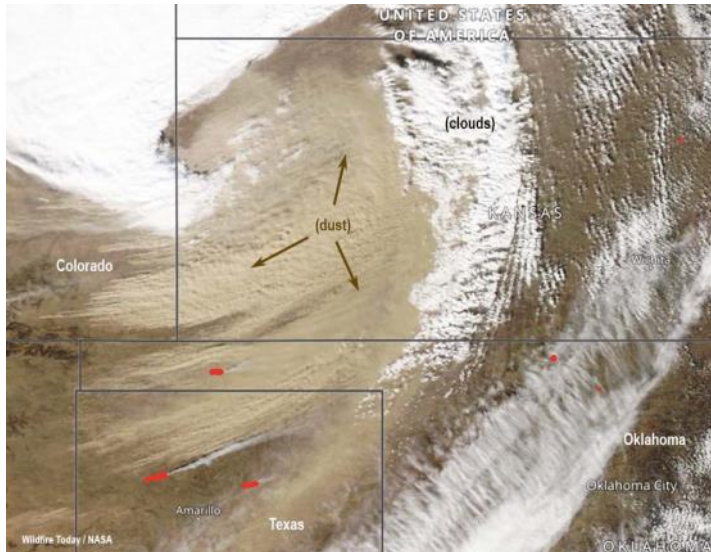


Image 10 - Satellite photo, fires in Oklahoma, and Texas, Dec. 15, 2021. The red areas indicate fires. Photo courtesy of Wildfire Today.

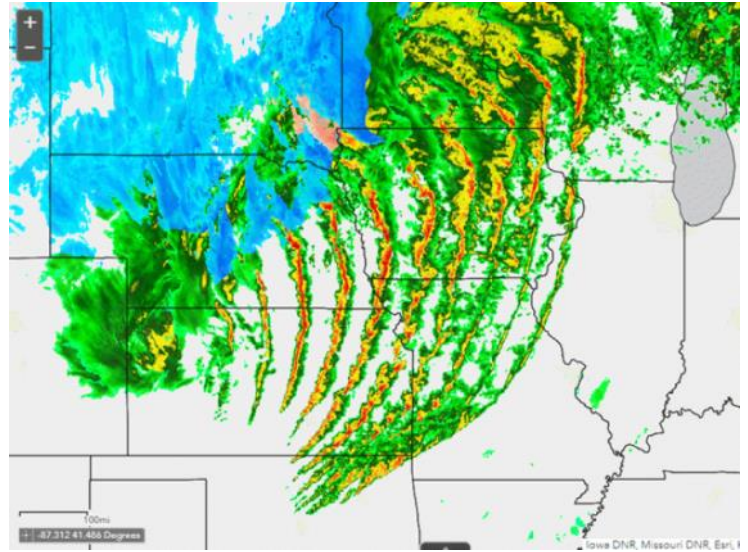


Image 11 - Progression of the line of severe storms, as shown on radar. Image courtesy of DTN.

Do you have a NOAA Weather Radio?

What is it?

NOAA Weather Radio (NWR) broadcasts National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day.

How does it notify you?

Weather radios equipped with a special alarm tone feature can sound an alert and give you immediate information about a life-threatening situation. During an emergency, NWS forecasters will send out a special tone to activate weather radios in the listening area.



Where do you get a NWR?

You can buy receivers at many retail outlets such as electronics, department, sporting goods, and boat and marine accessory stores and their catalogs as well as online at: <http://www.nws.noaa.gov/nwr/info/nwrrcvr.html#residential>

How much does it cost?

Prices start at \$20 & up depending on the model.

Options for those with special needs?

The hearing- and visually impaired can get these warnings by connecting weather radios with alarm tones or other such as strobe lights, pagers, bed-shakers, personal computers and text printers.

Public safety experts agree: a NOAA Weather Radio should be standard equipment in every home.

**KANSAS SEVERE WEATHER PREPAREDNESS WEEK
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Be a Force of Nature

Help Build a Weather-Ready Nation™

Do you know what to do in a severe weather emergency? Each year, people in this country are killed or seriously injured by all types of extreme weather, despite advance warning.

NOAA's Weather-Ready Nation (WRN) initiative is about helping our nation become more resilient to increasing extreme weather, water and climate events. NOAA is working to keep these threats from becoming disasters with greater accuracy in forecasts and warnings, evolving services to community decision makers, and better ways to communicate risk to stakeholders and the public.

As part of the WRN initiative, NOAA partners with emergency management officials, businesses, and the media to motivate individuals and communities to prepare for a potential weather disaster. And these actions can save lives – at home, in schools, and in the workplace.

What Does a Weather-Ready Nation Look Like?



A Weather-Ready Nation takes well-informed communities, businesses and individuals that are ready, responsive and resilient to extreme events. Key actions include:

- **Know your risk** by discovering the weather risks where you live and closely following National Weather Service forecasts and warnings.



- **Take action** by creating a family emergency plan and kit, and making sure you can receive emergency messages (e.g., NOAA Weather Radio, wireless emergency alerts).
- **Be an example** by using social media to share important hazard information.

How Your Organization Can Help Build a Weather-Ready Nation

Building a WRN requires the participation and commitment of a vast nationwide network of “Ambassadors” – organizations contributing in the best ways they can:

- Broadcasters advocating preparedness on-air
- Schools/universities teaching about the risks associated with severe weather and resiliency best practices
- Companies within the weather enterprise building the technological infrastructure for weather information and alerts
- Insurance companies providing discount incentives to policyholders who meet certain mitigation criteria

By becoming a **WRN Ambassador**, your organization can serve a pivotal role in affecting societal change by:

- Promoting Weather-Ready Nation messages
- Collaborating with NOAA
- Sharing your success stories
- Serving as an example



Enroll Here to Become an Ambassador
www.weather.gov/wrn/amb-tou

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